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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region 1

J.F.K. Federal Building, Boston, MA 02209-2211

MEMORANDUM

DATE: JUL 7 1998

SUBJ: Aerovox Incorporated Site-Approval Memorandum to perform an Engineering Evaluation/Cost Analysis for a Non- Time Critical Removal Action

FROM: Marianne Milette, Senior Enforcement Coordinator MM
Kimberly Tisa, PCB Enforcement Coordinator KTisa

TO: Patricia Meaney, Director
Office of Site Remediation and Restoration

Ira Leighton, Acting Director
Office of Environmental Stewardship

This memorandum recommends that you authorize the preparation of an engineering evaluation/cost analysis (EE/CA) for a non-time critical removal action (NTCRA) at the Aerovox Site in New Bedford, Massachusetts. The EE/CA will evaluate cleanup alternatives for source control measures at this Site. The EE/CA will be prepared by Aerovox, Inc., under EPA oversight. No federal funds will be expended in the preparation of the EE/CA.

This memorandum is not a final Agency decision regarding the selection of a response action for the Site. The Superfund decision making process for this Site will proceed as follows:

NTCRA (Source Control)

-- Sign Approval Memorandum to initiate EE/CA
-- Finalize EE/CA and prepare Fact Sheet of proposed action
-- Conduct 30 day comment period
-- Select the NTCRA in an Action Memorandum and respond to comments
-- Implement NTCRA through AOC with Aerovox, Inc.,

I. Site Description and History

The Aerovox Site (the Site) is located on an approximately 10 acre parcel at 740 Belleville Avenue in New Bedford, Massachusetts (see Attachment 1). The Site contains an approximately 450,000 square foot manufacturing building which has been used to produce film, paper and aluminum electrolytic capacitors. A parking lot is located south of the manufacturing building. Aerovox, Inc. and various predecessor companies have occupied the site for over 80 years. During 1995, Aerovox, Inc. purchased a small parcel located west of the original property (on the opposite side of Belleville Avenue) which has been used for additional parking space. The Site is located within a highly developed urban/industrial area of New Bedford, Massachusetts. The Acushnet River borders the Site to the east. The ground surface at the Site slopes gently from the west to the east. The elevation along Belleville Avenue at the west edge of the original property is approximately 14 feet above mean sea level (MSL) while the elevation toward the eastern edge of the Site (prior to reaching a seawall constructed along the bank of the Acushnet River) is generally between 4 and 7 feet above MSL. A chronology of significant events related to the Site is detailed below:

1982 Consent Order entered into by Aerovox, Inc., with the USEPA under Section 106 of CERCLA. A similar Consent Order was entered into by Aerovox, Inc. with the Massachusetts Department of Environmental Quality Engineering ("DEQE" now known as the "MADEP") at the same time. A site investigation was conducted pursuant to the Consent Orders. The investigation focused on an unpaved area at the eastern end of the site bordering the Acushnet River and an unpaved strip of land to the north of the manufacturing building. The results of the investigation indicated that PCBs were present in soil at concentrations exceeding 50 ppm and PCBs were also present within the shallow, perched ground-water system at the site.

1983 - 1984 As a result of the above investigation, construction of the final remedial action consisting of capping the impacted soil areas (by paving with hydraulic asphalt concrete) and installing a steel sheet pile cutoff wall to serve as a vertical barrier to ground water and tidal flow into and out of the impacted soils.

1988 Removal of two 10,000 gallon No.6 fuel oil storage tanks and one 250 gallon condensate collection tank from a former concrete oil containment bunker located south of the manufacturing building boiler room. Assessment of soil and ground water in the vicinity of the former concrete oil containment bunker. A Notice of Responsibility Letter was issued by the DEQE to RTE Aerovox, Inc., for additional assessment and evaluation of remedial measures.

1990 Removal of petroleum product and water from the concrete oil containment bunker, excavation of petroleum-impacted soils for on-site treatment and recycling into an asphalt base course for the parking lot, construction of an oil-water separator to control and recover floating petroleum product and post-construction monitoring of the oil-water separator system. The MADEP determined that no further remedial action was necessary for this matter by a letter dated July 26, 1993.

1997 Inspection of the manufacturing building conducted by the USEPA and involving the collection of wood shaving samples from floor areas inside the manufacturing building and collection of oil samples from various oil storage tanks/degreaser operations for PCB analysis. The data indicated the presence of PCBs in the wood floor samples at concentrations exceeding 50 ppm. PCBs were not detected above laboratory detection limits in the oil samples collected from tanks/equipment at the Aerovox, Inc., facility.

As a result of EPA's findings, Aerovox, Inc. contractors, East Coast Engineering, Inc. and Cistar Associates, conducted additional building material and air monitoring investigations. The data collected indicated the presence of PCBs throughout the facility.

II. Nature and Extent of Contamination

Based on the 1997 investigations, Blasland, Bouck & Lee, Inc (BBL), contractor for Aerovox, Inc., conducted additional sampling of building materials ie., full-core building material samples (wood, brick, and concrete), composite scrape samples of dust/dirt from elevated horizontal surfaces, wipe samples from non-porous building material surfaces (tile floor, painted walls, steel surfaces), and wipe samples from equipment. BBL also conducted soil sampling activities beneath the concrete floor slab of the manufacturing building and beneath the asphalt parking areas surrounding the building and ground water sampling. The results of all 1997 and 1998 investigations are summarized below:

Building materials (wood, brick, concrete, etc.):

The analytical results indicate that PCBs at concentrations of greater than 50 ppm were present in the wood floors, concrete floors, dust and dirt scrape samples. Analytical results indicate PCBs were detected in full core samples collected from the brick exterior walls and wood ceilings. Analytical results of wipe samples collected from non-porous building materials, appurtances and equipment contained PCBs at concentrations greater than 10 ug/100cm^2.

Soil samples:

Beneath the building:
The analytical results indicate that PCBs at concentrations up to 18,000 ppm were present. VOCs were detected between 0.7 ppm and 30 ppm.

Underneath the asphalt parking lot:
The analytical results indicate that PCBs at concentrations up to 2,900 ppm were present. VOCs were detected between 0.22 ppm and 1.1 ppm.

Ground water sampling:

The analytical results indicate PCBs up to 36 ppb were present. VOC's were detected up to 5,000 ppb.

Air Sampling:

Data indicated the presence of PCBs in the air samples at concentrations exceeding 0.001 mg/m^3 inside the building.

PCBs are the contaminant which may pose a potential threat to human health or ecological health based upon the above field investigations.

Tables 1 and 2 summarized the potential human health risk associated with the site.

TABLE 1
CALCULATION OF NONCANCER HAZARD
INGESTION AND DERMAL EXPOSURE

EXPOSURE POINT CONCENTRATION Reasonable maximum exposure (RME), $\mu g/cm^2$		HAZARD INDEX (RME)
Tank room operator	2.71	25.7
Carpenter	2.05	39.0
Pump room operator	5.986	113.7

TABLE 2
CALCULATION OF CANCER RISK
INGESTION AND DERMAL EXPOSURE

EXPOSURE POINT CONCENTRATION Reasonable maximum exposure (RME), μg/cm²		CANCER RISK (RME)
Tank room operator	2.71	5E-04
Carpenter	2.05	7E-04
Pump room operator	5.986	1E-03

III. Endangerment Determination

Actual or potential release of PCBs from this Site may present an imminent and substantial endangerment to public health or welfare or the environment. A removal action is therefore appropriate to abate, prevent, minimize, stabilize, mitigate, or eliminate such threats. In particular, a removal action is necessary to control or contain the release of hazardous substances from the Site through source control measures.

IV. Basis for EE/CA and Non-Time Critical Removal Action

Section 300.415(b)(2) of the National Contingency Plan (NCP) lists a number of factors for EPA to consider in determining whether a removal action is appropriate, including:

- (i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;

*

*

- (iv) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate;

*

- (vi) Threat of fire or explosion;

*

- (viii) Other situations or factors that may pose threats to public health or welfare of the United States or the environment.

The above conditions for a removal are met at this Site. The building occupants have actual or potential exposure. The potential non-cancer risk for workers exceeds the hazard index of 1 while the cancer risk ranges from 10^{-3} - 10^{-4}. The potential for tracking of the contamination to off-site areas also exists. Should the building become vacant with no security measures the threat of fire increases.

This removal is designated as <u>non-time critical</u> because more than six months planning time is available before on-site activities must be initiated. Prior to the actual performance of a non-time critical removal at this Site, Section 300.415(b)(4) of the NCP requires that an engineering evaluation/cost analysis (EE/CA) be performed in order to weigh different response options.

V. <u>Scope of the EE/CA</u>

The purpose of the EE/CA will be to evaluate alternatives for source control response measures at the Site. The EE/CA will consider alternatives which meet the following removal action objectives:

* Prevent, to the extent practicable, direct contact with and ingestion of soil/dust/debris/structures within the building and in the soils beneath the footprint of the building and under the paved parking areas.

* Prevent, to the extent practicable, the potential for water to infiltrate through the soils;

* Control, to the extent practicable, surface water run-off to minimize erosion;

* Prevent, to the extent practicable, the release of pollutants or contaminants at levels that would represent an unacceptable human health exposure to a Site worker or trespasser; and

* Remove soils/dust/debris/structures at levels that could result in an unacceptable ecological impact.

Pursuant to EPA guidance on EE/CAs, alternatives will be evaluated based upon effectiveness, implementability, cost, and compliance with ARARs. Further, alternatives which exceed $2 million dollars will be evaluated to determine their consistency with future remedial actions to be taken at the Site.

In developing the range of alternatives to be evaluated in the EE/CA, EPA will consider 300.415(e) of the NCP as well as relevant guidance. Section 300.415 (e) of the NCP identifies various removal actions which may be appropriate in given situations, including:

(1) Fences, warning signs, or other security or site control precautions - where humans or animals have access to the release;

(2) Drainage controls, for example, run-off or run-on diversion - where needed to reduce migration of hazardous substances...;

*

(4) Capping of contaminated soils or sludges - where needed to reduce migration of hazardous substances or pollutants or contaminants into soil, ground or surface water, or air;

*

(6) Excavation, consolidation, or removal of highly contaminated soils from drainage or other areas - where such actions will reduce the spread of the release; and

*

(8) Containment, treatment, disposal, or incineration of hazardous materials - where needed to reduce the likelihood of human, animal, or food chain exposures.

These alternatives and others may be evaluated in the EE/CA.

VI. Other Considerations

The current schedule is to have a final Administrative Order on Consent (AOC) for the Site signed by September 1998. If a non-time critical removal action were initiated, an Action Memorandum could be issued by November 1998, AOC negotiations would be conducted October - December 1998, and the removal action would commence by December 2000 and be completed by December 2003.

The State supports the proposed action at this Site.

VII. Recommendation

In light of the facts discussed above, the case team recommends that you approve the initiation of an EE/CA for this Site.

7/15/98
Date

Patricia Meaney
Patricia Meaney, Director
Office of Site Remediation and Restoration

Attachments:

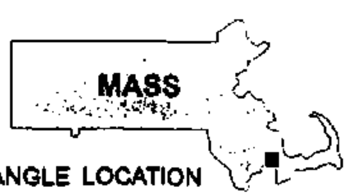
1. Site Location Map
2. Risk Evaluation

ATTACHMENT 1

REFERENCE: NEW BEDFORD NORTH, MASS. USGS QUADS., 7.5 MIN. SERIES, 1979.

2000' 0 2000'

APPROXIMATE SCALE: 1" = 2000'



QUADRANGLE LOCATION

Aerovox INC.
740 BELLEVILLE AVE., NEW BEDFORD, MA 02745 USA
ENGINEERING EVALUATION/COST ANALYSIS (EE/CA)

SITE LOCATION PLAN

BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists

03/98 SYR-D54-DJH
03655001/03655n01.COR

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EXCESS CANCER RISK AND HAZARD CALCULATIONS FOR AEROVOX

Excess Cancer Risk = oral risk + dermal Risk

= [C_{wipe} x 1mg/1000ug x FTSSx SA x FTSM x CFx ABS_ox F x D x CPF_o / BW x AT x 1yr/365days]+ [C_{wipe} x 1mg/1000ug x FTSSx SA x (1-FTSM) x CFx ABSdx F x D x CPF_o / BW x AT]

Where;

C_{wipe} = concentration of PCBs in wipe sample (ug/100cm2)(95UCL)
FTSS = fraction transferred from surface to skin (unitless)
SA = exposed surface area (cm^2)
FTSM = fraction tranferred from skin to mouth (unitless)
CF = contact frequency (events/day)
ABS_o=oral absorption fraction (unitless)
ABSd = dermal absorption fraction (unitless)
F = exposure frequency (days/yr)
D = exposure duration (yrs)
CPF_o =oral cancer potency factor (mg/kg-dy)-1
BW = adult body weight (kg)
AT = averaging time (days)[carcinogens (365dys/yr x 70yrs), noncarcinogens(365dys/yr x D)]

TABLE 4 1

VALUES USED FOR DAILY INTAKE CALCULATIONS

Aerovox Facility, New Bedford Harbor, MA

Exposure Scenario for the Carpenter

average 'central tendency'

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Chronic Daily Intake Fact Mg/Kg-dy
Ingestion	Cd	concentration of PCBs in dust (f)	ug/100cm2	205	see table 1	205	See Table 1	<u>Cancer</u>
+	FTSS	fraction transferred from surface to skin	fraction - unitless	0.01	a	0.0010	a	RME 1.6E-04
Dermal	SA	adult surface area	cm2	4000.00	b	3000.00	professional judgement	
	FTSM	fraction transferred from skin to mouth	fraction - unitless	0.0075	a	0.01	a	CT 6.2E-06
	CF	contact frequency	events/dy	8.00	prof judge	4	prof judge	
	ABSo	oral absorption fraction	fraction - unitless	1.00	c	1.00	b	
	F	exposure frequency	dys/yr	250.00	site-specific	250.00	site-specific	<u>Noncancer</u>
	D	exposure duration	yrs	25.00	c	25.00	c	
	CPFo	Oral Cancer Potency Factor	(mg/kg-dy)-1	2.00	d	1.00	d	RME 3.8E-04
	BW	adult body weight	kg	70.00	c	70.00	c	
	AT	averaging time (carcinogen)	days	25550.00	c	25550.00	c	CT 1.5E-05
		(noncarcinogen)		10950.00	c	10950.00	c	
	cf	conversion factor	mg/ug	0.001		0.001		
	RfDo	oral reference dose	mg/kg-dy	2.00E-05	IRIS, 97	2.00E-05	IRIS, 1997	
	ABSd	dermal absorption from dust	fraction - unitless	0.14	e	0.14	e	

a - USEPA (1996) Oral and Dermal Risk Assessment Final, Cressona, Aluminum Plant, Cressona, PA, From Debra Forman, PhD toxicologist Industrial Domain Section, Region 3 Philadephia, PA.

b - PTI Environmental Services (1993) Gastrointestinal Absorption of Selected Chemicals. Review of Evidence for Deriving Relative Absorption Factors EPA Contract # 68-WO-0032.

c - USEPA (1993) Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure Draft November

d - USEPA (1996). PCBs. Cancer Dose-Response Assessment and Application to Environmental Mixtures, National Center for Environmental Assessment Office of Research and Development, Washington, DC EPA/600/P-96-001F.

e - Wester, R., Maibach, H., Sedik, L. and J Melendres (1993). Percutaneous Absorption of PCBs from Soil: in Vivo Rhesus Monkey, in Vitro Human Skin, and bindiong to Powdered Human Straum Corneum Journal of Toxicology and Env. Health, 39, 375-382.

f- represents 90%x UCL of HI exposure areas + 10% x UCL of low exp. areas

Intake Factor (mg/kg-dy) = [cf x FTSS x SA x FTSM x CF x ABSo x F x D/BW x AT] + [cf x FTSS x SA x (1-FTSM) x CF x ABSd x Fx D/BW xAT]

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CALCULATION OF 95%UCL
Carpenter

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Most Frequented areas: Includes all surfaces from ceilings, floors, beams, in 1st floor pump room shipping dock, impregnation rackroom, final test area, receiving dock, tank room #2 and 2nd floor pump room

Conc (ug/100cm2)	LN of Conc	MEAN	sd	SD2	N	h STAT	UCL
26	3.258097	4.715039	0.919334	0.845175	67	2.196	217.2
28	3.332205						
29	3.367296						
33	3.496508						
34	3.526361						
39	3.663562						
45	3.806662						
45	3.806662						
46	3.828641						
47	3.850148						
48	3.871201						
48	3.871201						
49	3.89182						
51	3.931826						
52	3.951244						
54	3.988984						
54	3.988984						
55	4.007333						
55	4.007333						
59	4.077537						
63	4.143135						
63	4.143135						
64	4.158883						
67	4.204693						
71	4.26268						
72	4.276666						
74	4.304065						
76	4.330733						
84	4.430817						
88	4.477337						
88	4.477337						
95	4.553877						
107	4.672829						
108	4.682131						
109	4.691348						
112	4.718499						
112	4.718499						
115	4.744932						
115	4.744932						
117	4.762174						
126	4.836282						
126	4.836282						
131	4.875197						
131	4.875197						
132	4.882802						
144	4.969813						
159	5.068904						
168	5.123964						
176	5.170484						
180	5.192957						
190	5.247024						
193	5.26269						
202	5.308268						
202	5.308268						
203	5.313206						
241	5.484797						
247	5.509388						
249	5.517453						
270	5.598422						
320	5.768321						
410	6.016157						
430	6.063785						
480	6.173786						
890	6.791221						
930	6.835185						
1230	7.114769						
2300	7.740664						

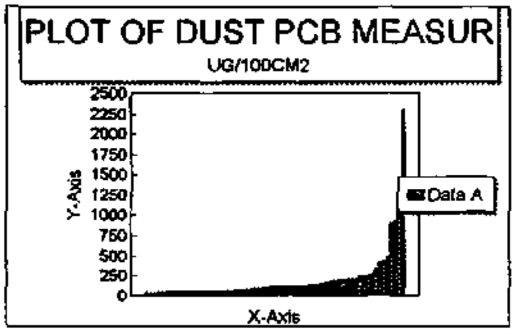

TABLE 4.1

VALUES USED FOR DAILY INTAKE CALCULATIONS

Aerovox Facility, New Bedford Harbor, MA

Exposure Scenario for the Tank Room Operator

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cd	concentration of PCBs in dust (f)	ug/100cm2	271	see table 1	271	See Table 1	<u>Cancer</u>
+	FTSS	fraction transferred from surface to skin	fraction - unitless	0.01	a	0.01	a	RME 6.5E-04
Dermal	SA	adult surface area	cm2	2000	b	1000	professional judgement	
	FTSM	fraction transferred from skin to mouth	fraction - unitless	0.015	a	0.015	a	CT 2.3E-06
	CF	contact frequency	events/dy	8	prof judge	4	prof judge	
	ABSo	oral absorption fraction	fraction - unitless	1	c	1	b	<u>Noncancer</u>
	F	exposure frequency	dys/yr	250	site-specific	250	site-specific	RME 1.9E-04
	D	exposure duration	yrs	25	c	25	c	
	CPFo	Oral Cancer Potency Factor	(mg/kg-dy)-1	2	d	1	d	CT 5.4E-05
	BW	adult body weight	kg	70	c	70	c	
	AT	averaging time (carcinogen)	days	25550	c	25550	c	
		(noncarcinogen)		10950	c	10950	c	
	RfDo	oral reference dose	mg/kg-dy	2E-05	IRIS, 97	2E-05	IRIS, 1997	
	ABSd	dermal absorption from dust	fraction - unitless	0.14	e	0.14	e	
	cf	conversion factor	mg/ug	0.001	-	0.001	-	

a - USEPA. (1996). *Oral and Dermal Risk Assessment: Final*, Cressona, Aluminum Plant, Cressona, PA. From Debra Forman, PhD toxicologist Industrial Domain Section, Region 3, Philadephia, PA.

b - PTI Environmental Services. (1993). Gastrointestinal Absorption of Selected Chemicals, Review of Evidence for Deriving Relative Absorption Factors. EPA Contract # 68-WO-0032.

c - USEPA (1993) Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure. Draft. November.

d - USEPA (1996). PCBs: Cancer Dose-Response Assessment and Application to Environmental Mixtures, National Center for Environmental Assessment, Office of Research and Development, Washington, DC EPA/600/P-96-001F.

e - Wester, R., Maibach, H., Sedik, L., and J. Melendres (1993). Percutaneous Absorption of PCBs from Soil: In Vivo Rhesus Monkey, in Vitro Human Skin, and bindking to Powdered Human Straum Corneum *Journal of Toxicology and Env. Health*, 39: 375-382.

f- represents 90%x UCL of Hi exposure areas + 10% x UCL of low exp. areas

Intake Factor (mg/kg-dy) = [cf x FTSS x SA x FTSM x CF x ABSo x F x D/BW x AT] + [cf x FTSS x SA x (1-FTSM) x CF x ABSd x Fx D/BW xAT]

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01/06/98

CALCULATION OF 9. UCL

TANK ROOM OPERATOR

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Most frequented areas: (Tank room 1, Impregnation rack room, final test area and and tank room 2)

Concentration*	LN	mean	sd	sd2	n	Hstat	UCL
64	4.158883	4.891547	0.901676	0.813	30	2.322	294.7
55	4.007333						
63	4.143135						
39	3.663562						
202	5.308268						
270	5.598422						
203	5.313206						
480	6.173786						
112	4.718499						
249	5.517453						
320	5.768321						
890	6.791221						
247	5.509388						
180	5.192957						
159	5.068904						
154	5.036953						
190	5.247024						
2300	7.740664						
76	4.330733						
55	4.007333						
48	3.871201						
63	4.143135						
74	4.304065						
88	4.477337						
117	4.762174						
144	4.969813						
67	4.204693						
159	5.068904						
115	4.744932						
54	3.988984						
45	3.806662						

*Includes all samples collected from surfaces except those samples collected from ceilings or beams. No samples reported ND.

Aerovox Facility, New Bedford Harbor, MA

Exposure Scenario for the Pump Room Operator

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Chronic Daily Intake Factor (mg/kg-dy)
Ingestion	Cd	concentration of PCBs in dust (f)	ug/100cm2	598.60	see table 1	599	See Table 1	Cancer
+	FTSS	fraction transferred from surface to skin	fraction - unitless	0.01	a	0.001	a	RME 8.5E-05
Dermal	SA	adult surface area	cm2	2000.00	b	1000	professional judgement	
	FTSM	fraction transferred from skin to mouth	fraction - unitless	0.015	a	0.030	a	CT 2.3E-06
	CF	contact frequency	events/dy	8	prof judge	4	prof judge	
	ABSo	oral absorption fraction	fraction - unitless	1	c	1	b	Noncancer
	F	exposure frequency	dys/yr	250	site-specific	250	site-specific	
	D	exposure duration	yrs	25	c	25	c	RME 1.9E-04
	CPFo	Oral Cancer Potency Factor	(mg/kg-dy)-1	2	d	1	d	
	BW	adult body weight	kg	70	c	70	c	CT 5.3E-06
	AT	averaging time (cancer)	days	25550	c	25550	c	
		(noncancer)		10950	c	10950	c	
	RfDo	oral reference dose	mg/kg-dy	2E-05	IRIS, 97	2E-05	IRIS, 1997	
	ABSd	dermal absorption from dust	fraction - unitless	0.14	e	0.14	e	
	cf	conversion factor	mg/ug	1.0E-03	-	1.0E-03	-	

a - USEPA. (1996) Oral and Dermal Risk Assessment: Final, Cressona, Aluminum Plant, Cressona, PA. From Debra Forman, PhD toxicologist Industrial Domain Section, Region 3, Philadephia, PA.

b - PTI Environmental Services. (1993) *Gastrointestinal Absorption of Selected Chemicals, Review of Evidence for Deriving Relative Absorption Factors.* EPA Contract # 68-WO-0032.

c - USEPA (1993) *Superfund's Standard Default Exposure Factors* for the Central Tendency and Reasonable Maximum Exposure. Draft. November.

d - USEPA (1996) *PCBs: Cancer Dose-Response Assessment and Application to Environmental Mixtures*. National Center for Environmental Assessment, Office of Research and Development, Washington, DC EPA/600/P-96-001F

e - Wester, R., Maibach, H., Sedik, L., and J. Melendres (1993) Percutaneous Absorption of PCBs from Soil: In Vivo Rhesus Monkey, in Vitro Human Skin, and bindking to Powdered Human Straum Corneum *Journal of Toxicology and Env. Health*, 39: 375-382.

f- represents 90%x UCL of Hi exposure areas + 10% x UCL of low exp. areas

Intake Factor (mg/kg-dy) = [cf x FTSS x SA x FTSM x CF x ABSo x F x D/BW x AT] + (cf x FTSS x SA x (1-FTSM) x CF x ABSd x Fx D/BW xAT]

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Calculation of 95%UCL

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Pump Room Operator

Pump Room (Most Frequented Areas)

Conc (ug/100cm2)*	LN	mean	SD	SD2	N	Hstat	UCL
115	4.744932	5.484244	0.832086	0.692	12	2.62	656.7
168	5.123964						
410	6.016157						
241	5.484797						
430	6.063785						
112	4.718499						
131	4.875197						
930	6.835185						
1230	7.114769						
193	5.26269						
202	5.308268						
71	4.26268						

*Includes all samples collected from surfaces except those samples collected from ceilings or beams. No samples reported NDs.

Cafeteria, Locker room, Hall (Less frequented areas)

Conc (ug/100cm2)*	LN	mean	SD	SD2	N	Hstat	UCL
18	2.890372	3.845847	0.534751	0.2859	13	2.155	75.3
39	3.663562						
62	4.127134						
31	3.433987						
30	3.401197						
21	3.044522						
63	4.143135						
42	3.73767						
47	3.850148						
84	4.430817						
67	4.204693						
124	4.820282						
70	4.248495						

*Includes all samples collected from surfaces except those samples collected from ceilings or beams. No samples reported NDs.

UCLpump room operator = 90% x 95UCL for most frequented areas + 10% x 95%UCL for less frequented areas:

=(656.7)(0.9) + (75.3)(0.1)

= 591.0+7.5=598.6

CALCULATION OF NONCANCER HAZARDS
INGESTION AND DERMAL EXPOSURE
AEROVOX FACILITY, NEW BEDFORD, MA

Exp Pt. Conc. RME ug/cm2	Exp Pt. Conc. CT ug/cm2	CDI RME (mg/kg-dy)	CDI CT (mg/kg-dy)	RfD mg/kg-dy	Hazard Index RME	Hazard Index CT
Tank Room Operator						
2.71	2.71	1.9E-04	5.4E-06	2E-05	25.7	0.7
Carpenter						
2.05	2.05	3.8E-04	1.5E-05	2E-05	39.0	1.5
Pump Room Operator						
5.986	5.986	3.8E-04	1.5E-05	2E-05	113.7	4.5

NOTES: Exp. pt conc - exposure pt concentration, equal to 10% x 95UCL of less frequented areas + 90% x 95UCL of more frequented areas.
CDI = chronic daily intake, see table 4.1-4.3
RfD = Reference Dose
RME - reasonable maximum exposure
CT - central tendency exposure

DRAFT

CALCULATION OF CANCER RISKS
INGESTION AND DERMAL EXPOSURES
AEROVOX FACILITY, NEW BEDFORD, MA

Exp Pt. Conc. RME ug/cm2	Exp Pt. Conc. CT ug/cm2	CDI RME (mg/kg-dy)	CDI CT (mg/kg-dy)	CPF (mg/kg-dy)-1	Cancer Risk RME	Cancer Risk CT
Tank Room Operator						
2.71	2.71	8.5E-05	2.3E-06	2	5E-04	1E-05
Carpenter						
2.05	2.05	1.6E-04	6.2E-06	2	7E-04	3E-05
Pump Room Operator						
5.986	5.986	8.5E-05	2.3E-06	2	1E-03	3E-05

NOTES: Exp. pt conc - exposure pt concentration, equal to 10% x 95UCL of less frequented areas + 90% x 95UCL of more frequented areas.
CDI = chronic daily intake, see table 4.1-4.3
CPF = cancer slope factor, from IRIS 1/98
RME - reasonable maximum exposure
CT - central tendency exposure

DRAFT

DRAFT

RISK/HAZARD CALCULATIONS
Oral + Dermal exposures (ug/100cm2)

Reference Risk/Hazard Level	Tank Room Operator	Carpenter	Pump Room Operator
1x10-6	0.5	0.3	0.6
1x10-5	5	3	6
1x10-4	50	30	60
HQ = 1	11	5	5

R2-

C/U # 10^{-6} ug/100cm² .3 → R60 → 10^{-4} [illegible] for HI = 1 C/U = 3.6

maintenance

CHEM RISK

7.5

maintenance

R3 (Westinghouse)

0.7

maintenance

DEPARTMENT OF HEALTH AND HUMAN SERVICE.

Public Health Service

National Institute for Occupation.
Safety and Health
Robert A. Taft Laboratories
4676 Columbia Parkway
Cincinnati OH 45226-1998

January 12, 1998

Ms. Ann-Marie Burke
U.S. EPA, Region 1
JFK Federal Bldg., HBS
Boston, MA 02203

Dear Ms. Burke:

This letter summarizes some of the points that we made during our December 17th teleconference with you and others from the U.S. EPA.

Status of ongoing NIOSH studies. NIOSH has three ongoing studies of PCB-exposed workers: 1) a mortality update (of the Brown 1987 study) and a registry-based cancer incidence study of the New York and Massachusetts cohorts; 2) a mortality update of the 1992 Sinks study of the Indiana cohort; and 3) a breast cancer incidence study among women in the New York, Massachusetts, and Indiana cohorts. Results for these studies are anticipated in the next 2-3 years.

Relationship between PCB exposure and specific health effects. The human evidence for certain cancers is suggestive; for other cancers, the evidence is equivocal. For a summary of these studies and studies that examine other health effects, we refer you to the ATDSR document, "Toxicological Profile for Polychlorinated Biphenyls", draft report published in February of 1996. We understood from one of your colleagues participating in the teleconference that the final report has been published, but we have not yet seen it.

How well serum PCB levels reflect exposure. Because PCBs are taken up through multiple exposure routes, including dermal absorption, inhalation, and ingestion, and because no data exist regarding the relative contributions of these mechanisms for PCB uptake, biologic measures are superior to exposure estimates that assume relative contributions from various routes of exposure. Studies of human exposures to PCBs generally evaluate biologic measures rather than environmental measures. In the case of PCBs, excellent analytical methods exist for serum and adipose tissue quantitation down to the part per trillion level. We list below several PCB human exposure assessment studies that have evaluated blood and/or adipose tissue levels:

ATSDR Toxicological Profile for PCBs, Draft for Public Comment, August 1995.
IARC Monograph on Polychlorinated Biphenyls, Volume 18
WHO Environmental Health Criteria Document for PCBs, EHC 140, 1993
Kreiss K, Env Health Perspect 60:193, 1985
Lees P et al, AIHAJ 48:257, 1987
Luotamo M, et al, Scand J Work Env Health, 14:60, 1988
Luotamo M et al, Env Oes 54:121, 1991
Luotamo M et al, Chemosphere v27, no.1-3, p171-177, 1993

Maroni M et al, BJIM 38:49, 1981
Maroni M et al, BJIM 38:55, 1981
Phillips D, Smith et al, Arch Env Health 44:351, 1989
Skerfving S, et al, Clin Chem 40/7, 1409-1415, 1994
Swanson M et al, Reg Tox & Pharmcol 21:136-150, 1995
Wolff M, Thornton J et al, Tox Appl Pharmacol 62:294, 1982
Wolff M, Env Health Perspect 60:133, 1985
Woodruff T et al, Env Res 65, 132-144, 1994

If we can be of further help, please don't hesitate to call us (Dr. Whelan at 513-841-4437 and Dr. Waters at 513-841-4458).

Sincerely yours,

Elizabeth Whelan

Elizabeth A. Whelan, Ph.D.
Chief, Epidemiology I Section

Martha A. Waters

Martha Waters, Ph.D.
Chief
Exposure Assessment Methods Activity
Industrywide Studies Branch
Division of Surveillance, Hazard
Evaluations and Field Studies

Jellinek, Schwartz & Connolly, Inc.
1525 Wilson Boulevard, Suite 600
Arlington, VA 22209
(703) 527-1670 • Fax: (703) 527-5477

Consultants in Environmental Science, Policy & Management

JSC

MEMORANDUM

TO: Marianne Milette

FROM: Katinka van der Jagt

DATE: November 20, 1997

SUBJECT: Follow Up EPA's Meeting With Aerovox On 11/12

During a November 12, 1997, meeting between Aerovox and EPA Region 1officials, Aerovox was asked by Marianne Milette (EPA) to address five questions relating to potential exposure of Aerovox employees to polychlorinated biphenyls (PCBs). This memorandum responds to the five questions.

Q1) What type of worker would be the most potentially exposed to PCBs in the current Aerovox environment?

A1) Tank Room Operator, Pump Room Operator, Carpenter, and Mechanic, would be the most potentially exposed. The reason for exposure for the Tank Room Operator and Pump Room Operator is that they work in an area where the highest levels of PCB contamination were found. The reason for exposure for the Carpenter and the Mechanic is the type of work they perform. Their work potentially causes re-suspension of PCB contamination and during the performance of their job, surfaces are contacted more frequently. They may at times contact surfaces as ceilings, ceiling beams, and floors.

Q2) What group of individuals make up this category?

A2)

Job Title	Sex	Age Group in years	Employment Period in years	Number of Employees	Shifts per day
Tank Room Operator	Males	35 - 55	10 - 15	4 per shift, 7 days per week	3
Pump Room Operator	Males	35 - 55	10 - 15	1 per shift, 7 days per week	3
Mechanic	Males	30 - 35 (one employee = 25)	10 - 15	4 employees, 5 days per week	1
Carpenter	Males	45 - 50	15 - 20	2-1 per day, 5 days per week	1

Q3) Describe the clothing they wear on a typical workday.

A3)

Tank Room Operator:	safety shoes, cotton gloves, uniform, safety glasses
Pump Room Operator:	safety shoes, cotton gloves, uniform, safety glasses
Mechanic:	safety shoes, cotton gloves (occasional), uniform, safety glasses
Carpenter:	safety shoes, uniform, safety glasses

The uniforms are put on, worn, and taken off at the plant and laundered. Cotton gloves are usually changed or replaced 1-3 times a day.

Q4) How much time of this worker's day is spent in each room of the facility.

A4)

Tank Room Operator:	7 hours in the tank room, 30 minutes in the cafeteria, 30 minutes on miscellaneous activities (going for a walk, running errands etc.)
Pump Room Operator:	7 hours in the pump room, 30 minutes in the cafeteria, 30 minutes on miscellaneous activities
Mechanic:	1 mechanic spends 4 hours in the pump room, while the other mechanics perform duties throughout the building, all of them spend 3 hours in the machine-repair shop, 30 minutes on miscellaneous activities
Carpenter:	3.5 hours in the mechanic shop, 3.5 hours performing duties throughout the building, 30 minutes in the cafeteria, 30 minutes on miscellaneous activities

Q5) Describe their activities in each room.

A5) See the attached activity description in Table.

Job Title and Location	Activity	Hours/ Day	Detailed Breakdown
Tank Room Operator tank room	Capacitors are received in baskets that have been placed on carts for transportation. By use of a chain fall or air operated hoist the baskets are lifted and placed inside of the impregnation tank. Cotton gloves are worn. During the impregnation cycle valves are normally opened and closed at the rate of 2 times per hour (no gloves are worn). At the end of impregnation cycle the impregnated capacitors are removed and placed onto trays in the same manner as loading (cotton gloves). The excess oil is removed from the inside of the tank with a squeegee.	2 1 4	Handling materials in baskets (clean capacitors to be impregnated). Paperwork. Working around tank: loading, unloading, open and close valves.
cafeteria	Eating lunch.	0.5	-
miscellaneous	Going for a walk, running errands etc.	0.5	-
Pump Room Operator pump room	Pump room operator stays in the pump room area and services the vacuum pumps as required. Opening valves starting and stopping pumps as per tank requirements. There are 35 vacuum pumps. The operator also lubricates the pumps and maintains the pumps as required.	7	Some paper work at desk, managing pumps, setting valves.
cafeteria	Eating lunch.	0.5	-
miscellaneous	Going for a walk, running errands etc.	0.5	-
Mechanic pump room	Normal equipment repairs, installation, pump repair, works throughout plant. Preventive maintenance on all equipment.	4	Pump room maintenance by 1 of the mechanics, the remaining 3 work in other areas of the plant, rotating schedule
shop	All other miscellaneous shop functions, reading materials, ordering materials, delivering to sites, work in shop.	3.0	-
cafeteria	Eating lunch.	0.5	-
miscellaneous	Going for a walk, running errands etc..	0.5	-
Carpenter throughout building	Normal carpentry duties and equipment, would occasionally repair floors, walls, ceilings, etc.	3.5	25% of time is spent on destruction, 75% of time is spent on construction with new materials.
shop	All other miscellaneous shop functions, reading materials, ordering materials, delivering to sites, work in shop.	3.5	-
cafeteria	Eating lunch.	0.5	-
miscellaneous	Going for a walk, running errands etc.	0.5	-